REMARKS/ARGUMENTS

Claims 1-50 were previously pending in the application. Claims 10 and 37-47 are amended, and new claims 51-52 are added herein. Assuming the entry of this amendment, claims 1-52 are now pending in the application. The Applicant hereby requests further examination and reconsideration of the application in view of the foregoing amendments and these remarks.

Support for the amendment of claim 41 and for new claims 51-52 can be found, for example, in claim 16; on page 15, lines 16-20; and in claim 1, respectively. Support for the amendment of claims 37-40 and 42-47 can be found, for example, in Fig. 6 and on page 11, lines 3-12.

On page 2 of the office action, the Examiner rejected claims 1-50 under 35 U.S.C. § 102(b) as being anticipated by Lane. For the following reasons, the Applicant submits that all pending claims are allowable over Lane.

<u>Claims 1-36:</u>

Claim 1 is directed to a receiver for identifying a message based upon a received signal. The receiver has a processor and a comparator. The processor generates minimum and maximum thresholds representing a range for each of a plurality of possible message levels, wherein the <u>sizes of the ranges are different for at least two of the message levels</u>. The comparator identifies the message by comparing the received signal with the generated minimum and maximum thresholds.

Lane teaches a circuit (e.g., circuit **500** of Fig. 5) designed to determine the constellation size of a quadrature amplitude modulated (QAM) signal. More specifically, circuit **500** is designed to determine whether a received QAM signal is a 16-ary or 32-ary QAM signal (see, e.g., col. 9, lines 15-18). Circuit **500** operates by first squaring and normalizing the received QAM signal, and then analyzing the probability distribution function (pdf) of the normalized signal accumulated over a predetermined period of time (see, e.g., col. 7, lines 13-44). For the pdf analysis, circuit **500** has two bins labeled BIN 2 and BIN 3 in Fig. 5. Each bin is configured to count instances of signal occurrence within the bin boundaries that are defined by the levels of the corresponding upper and lower threshold signals applied to the bin comparators (i.e., comparators **512** and **514** of BIN 2 and comparators **516** and **518** of BIN 3). The level difference between the upper and lower threshold signals determines the bin width for each of the bins (see, e.g., col. 8, lines 12-14). The number of counts produced in each bin are compared with one another at the end of the accumulation period to determine whether the QAM signal is 16-ary or 32-ary.

In the rejection of claim 1, on page 2, the Examiner stated that:

> Lane discloses a receiver ... comprising: a processor that generates a minimum threshold and a maximum threshold representing a range for each of a plurality of possible message levels (see fig. 5 element **500** and col.8, lines 3-28) wherein the sizes of the ranges are different for at least two of [the] message levels.

Assuming that the Examiner equated the widths of Lane's bins with the sizes of ranges for message levels in claim 1, for the reasons stated below, the Applicant respectfully disagrees with the Examiner's statement and submits that Lane <u>explicitly</u> teaches that different bins of his circuit have the <u>same bin width</u>.

Regarding circuit **500** (Fig. 5), Lane explicitly teaches that BIN 2 and BIN 3 have the <u>same width</u> with a value of, e.g., 0.25 of the normalized power (col. 8, lines 12-26). More specifically, Lane teaches

that (I) one of the bins has threshold levels of 0.375 and 0.625 (col. 8, lines 17-20) and (II) the other bin has threshold levels of 0.875 and 1.125 (col. 8, lines 23-26). As such, both BIN 2 and BIN 3 have the same width (i.e., 0.625−0.375=1.125−0.875=0.25). The Applicant submits that nowhere in the description of circuit **500** (see columns 7-10) does Lane teach or even suggest bins (message levels) having different widths (sizes of the ranges).

Furthermore, the sole purpose of Lane's Fig. 3 is to teach how to choose a <u>single optimal width</u> value that would work relatively well for both 16-ary and 32-ary QAM signals. More specifically, curves **302** and **304** of Fig. 3 show the probability of error as a function of bin width for 16-ary and 32-ary QAM signals, respectively. Based on these curves Lane specifies that, to minimize the probability of error, a single optimal bin width should be selected from values between 0.25 and 0.3 of the normalized power (col. 6, lines 57-60). The Applicant submits that Lane fails to even recognize that, based on curves **302** and **304**, the width for one bin can be selected to correspond to, e.g., the minimum of curve **302**, while the width for another bin can be selected to correspond to, e.g., the minimum of curve **304**. Instead, Lane seeks a uniform configuration for all bins and explicitly provides that a single compromise bin width should be selected. According to Lane, this compromise bin width should correspond to neither of the curve minima, but, rather, belong to a range (0.25 to 0.3) located between the curve minima. In view of (i) Lane's lack of recognition of possible use of different widths in different bins and (ii) the explicit teaching directed to the selection of a single optimal width for all bins, the Applicant submits that not only Lane does <u>not</u> teach or suggest different widths for different bins, he, in fact, teaches away from selecting different widths for different bins.

For all these reasons, the Applicant submits that claim 1 is allowable over Lane. For similar reasons, the Applicant submits that claims 10, 20, and 21 are also allowable over Lane. Since claims 1-9, 11-19, and 22-36 depend variously from claims 1, 10, 20, and 21, it is further submitted that those claims are also allowable over Lane. In view of the foregoing, the Applicant submits that the rejections of claims 1-36 under § 102 have been overcome.

<u>Claims 16, 31, 41, and 51-52:</u>

Claim 41 is directed to a method of forming a constellation design having a selected number of message levels. Said method has the steps of: calculating the distance d(i) between possible signal levels; identifying whether the calculated distance $d(i) > d_{min}$, wherein d_{min} represents a selected minimum value; and <u>adjusting the constellation design</u>, when $d(i) \leq d_{min}$.

As already discussed above, Lane teaches a circuit designed to determine the constellation size of a QAM signal. As such, the circuit of Lane simply accepts the constellation design used by the transmitter and <u>cannot</u> in any manner change or adjust that design. As such, Lane does not teach or even suggest a method of forming a constellation design having the step of adjusting the constellation design, when $d(i) \leq d_{min}$. In contrast, a circuit operating in accordance with claim 41 is able to adjust the constellation design, when $d(i) \leq d_{min}$, e.g., by providing a feedback to the transmitter. Advantageously, this adjustment can help to reduce the number of decoding errors at the receiver.

For all these reasons, the Applicant submits that claim 41 is allowable over Lane. Since claims 51-52 depend from claim 41, it is further submitted that those claims are also allowable over Lane.

Claims 16 and 31, which depend from claims 10 and 21, respectively, similarly recite "adjusting the constellation design." The Applicant submits that the same reasons that make claim 41 allowable over Lane also provide additional reasons for the allowability of claims 16 and 31.

Claim 51 further specifies that the step of adjusting comprises removing from the constellation design a message level that gives rise to $d(i) \leq d_{min}$. The Applicant submits that Lane does not teach or suggest such a limitation. This fact provides additional reasons for the allowability of claim 51.

Claim 52 further specifies that the sizes of the ranges are different for at least two of the message levels. The novelty of this limitation with respect to the teachings of Lane is already discussed above in the context of claim 1. This novelty provides additional reasons for the allowability of claim 52.

<u>Claims 37-40 and 42-50:</u>

Claim 37 is directed to a receiver for identifying a message based upon a received signal. The receiver has a processor and a comparator. The processor generates a minimum threshold and a maximum threshold representing a variable range for each of a plurality of possible message levels <u>in a single constellation design</u>, and the comparator identifies the message by comparing the received signal with the generated minimum and maximum thresholds, wherein the minimum and maximum thresholds are a function of an interrelationship between noise and the message level.

As already indicated above, Lane teaches a circuit (e.g., circuit **500** of Fig. 5) designed to determine whether a received QAM signal is a 16-ary or 32-ary QAM signal (see, e.g., col. 9, lines 15-18). As such the threshold levels in the circuit of Lane represent <u>two different</u> (i.e., 16-ary or 32-ary) <u>constellation designs</u>. Because the purpose of Lane's circuit is to distinguish between the two (or more) different constellation designs, it is submitted that Lane does not teach or suggest a processor that generates a minimum threshold and a maximum threshold representing a variable range for each of a plurality of possible message levels <u>in a single constellation design</u>.

For all these reasons, the Applicant submits that claim 37 is allowable over Lane. For similar reasons, the Applicant submits that claims 38-40 and 42-47 are also allowable over Lane. Since claims 48-50 depend variously from claim 47, it is further submitted that those claims are also allowable over Lane.

In view of the above amendments and remarks, the Applicant believes that the now pending claims are in condition for allowance. Therefore, the Applicant believes that the entire application is now in condition for allowance, and early and favorable action is respectfully solicited.

Respectfully submitted,

[signature]

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